

## New Mars plan targets sample return

*International effort to pave way for robotic colonies by 2010*

By DIANE AINSWORTH

A new architectural blueprint for international robotic exploration of Mars, resulting in the return of several samples of Martian material to Earth by 2008 and founding of the first permanent robotic colonies by the end of that decade, has been launched by NASA and its international partners in space exploration.

"This plan paves the way for the return of as many as four samples of Martian material from four different sites by 2011, and will lead to the establishment of the first robotic outposts and, eventually, human colonies on Mars," said Norman Haynes, Mars Exploration Program director at JPL.

Under a new plan drafted by NASA and its French, Italian and European counterparts, the consortium of spacefaring nations will begin development of affordable spacecraft and innovative new technologies to obtain in-situ measurements and samples of Martian material in preparation for human exploration of the planet. The plan calls for construction of a fleet of affordable launch vehicles, orbiters, landers, rovers and Mars ascent vehicles designed to wage an all-out effort to begin returning samples of the Martian regolith as early as April 2008.

"This plan lays out the whole framework for our next quantum leap in Mars exploration," said Dr. Charles Elachi, JPL's Space and Earth Sciences Program director and head of the architecture study. "The establishment of the first permanent robotic colonies on Mars, capable of harnessing the planet's natural resources to build a technology base for space flight to and from the planet and biospheres for human settlements well within the lifetimes of our grandchildren, is the most exciting prospect awaiting us as a global community."

The new Mars architecture plan, which is currently being refined by NASA and participating space agencies, underscores the roles and responsibilities of the four space agencies in formulating an integrated, international roadmap for the exploration of Mars.

According to Haynes, the study focuses on robotic surface activities during the early launch opportunities beginning in 2001 through 2011. Many of the early missions will focus on studies of the Martian surface involving science payloads designed to conduct chemical analyses of rocks and soils, obtain rock core samples and tap subsurface water reservoirs and other

natural resources that could be used to manufacture propellants to fuel sample-return vehicles.

Work on the architectural redesign began in June. Eight "tiger teams" of experts from the international scientific community, led by Elachi and Dr. Frank Jordan, manager of JPL's Mars Program Planning and Architecture Office, were formed to address issues of spacecraft design, innovative technologies and science goals for missions beginning in 2003, as well as for achieving the overall goals of the long-range Mars Surveyor Program. Recommendations were presented to NASA Administrator Daniel Goldin on Sept. 24 and,

subsequently, approved for implementation.

New requirements for the 2001 Mars missions, brought about earlier in the year by Congressional markups of the fiscal year 1999 NASA budget, prompted the redesign effort. The Mars 2001 project went to work to hammer out a compromise of scientific instruments on the proposed orbiter, lander and rover to meet new budget and spacecraft mass requirements.

Under the current mission architecture, the Mars 2001 lander will be equipped with a robotic arm and descent camera to explore materials buried below the Martian surface. The spacecraft will also carry a panoramic camera and mini-

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## New images show Martian lava flow plates, active dunes

By DIANE AINSWORTH

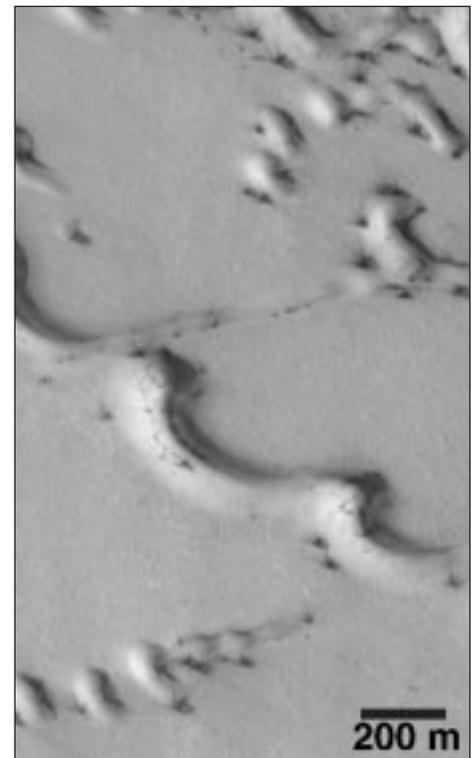
The latest images from JPL's Mars Global Surveyor spacecraft show giant plates of solidified volcanic lava and evidence for active dunes near the planet's north pole, with sands that have hopped or rolled across the surface in recent months.

The images were presented Oct. 29 by members of the mission science team at the annual meeting of the Geological Society of America in Toronto, Canada.

The close-up views of Mars' Elysium Basin reveal the first evidence of huge plates of solidified lava, rather than lakebed sediments, that appear to have been broken up and transported across the Martian surface millions of years ago as they floated on top of

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**Close-up views of Mars' Elysium Basin reveal the first evidence of huge plates of solidified lava, rather than lakebed sediments, that appear to have been broken up and transported across the Martian surface millions of years ago as they floated on top of molten lava. This implies that the area in the planet's northern lowlands was once the site of giant ponds of lava flows hundreds of kilometers across.**



# Special Events Calendar

## Ongoing

**Alcoholics Anonymous**—Meeting at 11:30 a.m. Mondays, Tuesdays, Thursdays (women only) and Fridays. For more information, call Occupational Health Services at ext. 4-3319.

**Codependents Anonymous**—Meeting at noon every Wednesday. For more information, call Occupational Health Services at ext. 4-3319.

**Gay, Lesbian and Bisexual Support Group**—Meets the first and third Fridays of the month at noon in Building 111-117. For more information, call employee assistance counselor Cynthia Cooper at ext. 4-3680 or Randy Herrera at ext. 3-0664.

**Parent Support Group**—Meets the fourth Tuesday of the month at noon. For location, call Jayne Dutra at ext. 4-6400.

**Senior Caregivers Support Group**—Meets the second and fourth Wednesdays of the month at 6:30 p.m. at the Senior Care Network, 837 S. Fair Oaks Ave., Pasadena, conference room #1. For more information, call (626) 397-3110.

## Friday, November 13

**JPL Dance Club**—Meeting at noon in Building 300-217.

**"Italy"**—This travel film will be presented at 8 p.m. in Caltech's Beckman Auditorium. Tickets are \$9 and \$7. Call (626) 395-4652.

## Fri., Nov. 13-Sun., Nov. 15

**"School For Husbands"**—This Theater Arts at Caltech production featuring Caltech students, faculty and staff will be presented at the campus' Dabney Lounge Friday and Saturday at 8 p.m.; Sunday at 3 p.m. Tickets are \$15.

## Saturday, November 14

**Caltech-Occidental Concert Band**—The program for this free, 8 p.m. performance in Caltech's Beckman Auditorium performance is to be announced. For information, call (626) 395-4652.

## Monday, November 16

**ERC Holiday Party**—Tickets go on sale today for this annual event that includes entertainment, gifts and visits from Santa and Mrs. Claus, to be held Saturday, Dec. 5 at Lanterman Auditorium in La Cañada. Cost: \$3 per person.

**Musica Angelica**—A varied program of Medieval and Renaissance vocal and instrumental music will be performed free of charge

at 7:30 p.m. in Caltech's Dabney Lounge. For information, call (626) 395-4652.

## Tuesday, November 17

**"Depression: Medications and Prevention"**—Dr. Todd Hutton of Las Encinas Hospital, assistant clinical professor of psychiatry at USC and a representative for the Southern California Psychiatric Society's East Los Angeles region, will discuss the different types of depression, how to prevent it, and treatment options available, with a focus on medications. At noon in the Building 167 conference room. Sponsored by the Director's Advisory Council for Women.

**Investment Workshops**—TIAA-CREF representatives will present "Basics of Retirement" at 11 a.m. and "Retirement Income Options" at 2 p.m. Both will be held in Building 180-101. Seating will be limited.

## Wednesday, November 18

**Investment Advice**—Fidelity Investments representative Jasson Rasmussen will be available for individual counseling. For an appointment, call Patrice Houlemard at ext. 4-2549

**JPL Drama Club**—Meeting at noon in Building 301-127.

**JPL Hiking Club**—Meeting at noon in Building 303-209.

**Russian Language Workshop**—Meets from 7 to 9 p.m. on the Caltech campus. Some knowledge or previous study of the language is essential. For location and further information, call Joyce Wolf at ext. 4-7361.

**"Unnatural Selection: The Future of Proteins"**—Dr. Frances Arnold, professor of chemical engineering at Caltech, will deliver this free lecture at 8 p.m. in Beckman Auditorium. For information, call (626) 395-4652.

## Thursday, November 19

**Caltech Architectural Tour**—The Caltech Women's Club presents this free service, which is open to the public. The tour begins at 11 a.m. and lasts about 1 1/2 hours. Meet at the Athenaeum front hall, 551 S. Hill, Pasadena. For information and reservations, call Susan Lee at (626) 395-6327.

**"Gene Therapy: The Promise and the Progress"**—The fifth annual Caltech Biology Forum will feature a panel moderated by Robert Lee Hotz of the Los Angeles Times. At 7:30 p.m. in Caltech's Beckman Auditorium. Admission is free, but tickets are required. For information, call (626) 395-4652.

**JPL Atari Club**—Meeting at noon in

Building 238-544.

**JPL Bicycle Club**—Meeting at 5 p.m. in the Building 167 conference room.

**Social Security**—Representative Ann Villeroy will be available in the Building 167 cafeteria, from 1:30 p.m. to 3:30p.m. There will be no Social Security consultation on Lab in December.

**Von Kármán Lecture Series**—Mars Exploration Director Norm Haynes will discuss "Going Back to Mars—The Mars '98 Missions Revisit the Red Planet" at 7 p.m. in von Kármán Auditorium. Open to the public.

## Friday, November 20

**JPL Dance Club**—Meeting at noon in Building 300-217.

**Von Kármán Lecture Series**—Mars Exploration Director Norm Haynes will discuss "Going Back to Mars—The Mars '98 Missions Revisit the Red Planet" at 7 p.m. in The Forum at Pasadena City College, 1570 E. Colorado Blvd. Open to the public.

## Saturday, November 21

**Ancient Chinese Dance**—The Lily Cai Chinese Dance Company, which blends ancient and modern dance techniques and styles, will perform at 8 p.m. in Caltech's Beckman Auditorium. Tickets are \$25, \$21 and \$17. Call (626) 395-4652.

## Sunday, November 22

**Caltech-Occidental Symphony Orchestra**—The program for this free concert at 3:30 p.m. in Ramo Auditorium will include pieces by Tchaikovsky and Johann and Richard Strauss. For information, call (626) 395-4652.

**Chamber Music**—The Arditti String Quartet with Ursula Oppens on piano will perform at 3:30 p.m. in Caltech's Beckman Auditorium. Tickets are \$25, \$21, \$17 and \$13. For information, call (626) 395-4652.

## Wednesday, November 25

**JPL Drama Club**—Meeting at noon in Building 301-127.

**JPL Toastmasters Club**—Meeting at 5:30 p.m. in the Building 167 conference room. Guests welcome. For more information, contact Mary Sue O'Brien at ext. 4-5090

**Russian Language Workshop**—Meets from 7 to 9 p.m. on the Caltech campus. Some knowledge or previous study of the language is essential. For location and further information, call Joyce Wolf at ext. 4-7361.

# Stardust ships to Kennedy

At the company's facilities near Denver, Lockheed Martin Astronautics technicians prepare JPL's Stardust spacecraft for its shipment to Kennedy Space Center on Nov. 11. Stardust is scheduled to be launched on Feb. 6, 1999. It will use aerogel to capture comet particles and interstellar dust and return them to Earth for detailed analysis.



LOCKHEED MARTIN ASTRONAUTICS PHOTO

## DS1 ion engine turns off; team investigates

After operating as expected for approximately 4½ minutes after startup Tuesday, Nov. 10, Deep Space 1's xenon ion engine turned off for reasons that are still under investigation.

After the startup at 11:30 a.m. PST and subsequent shutdown Tuesday, the operations team sent a number of commands to try to restart the ion propulsion system. Each time, the system went through its normal startup routine, but was unable to achieve thrusting.

Valuable diagnostic data were collected, and the team observed that the rest of the spacecraft behaved exactly as planned during the brief interval of thrusting and during subsequent attempts to restart the thruster.

Engine turn-off behavior has been observed in the past in solar electric propulsion systems both in Earth-based test and on Earth-orbiting spacecraft. Deep Space 1

is designed to test and validate the use of such propulsion in deep space for the first time, so the ongoing diagnosis of Tuesday's behavior is in keeping with the mission's goals.

Tuesday's planned activities had included stepping up the thruster through different throttle levels over more than 16 hours, taking the engine to its peak thrusting level. This would allow the team to assess the overall performance of the spacecraft and the ion propulsion system at increasingly powerful levels and to measure the power needed from the spacecraft's pair of solar arrays to achieve each thrust level.

Concurrently, ground-based radio navigation was to take Doppler data to measure the amount of thrust imparted by the ion engine system at each throttle level. These activities will be conducted once the resolution of Tuesday's premature shutdown is

found.

On Wednesday, Nov. 11, other technology validation activities will continue while a portion of the team analyzes Tuesday's data and formulates a plan for subsequent ion propulsion system operations. Much of the key testing will be completed within the first eight weeks after launch; the technologies on which the spacecraft depends for its basic operation—such as its solar arrays and the transponder or radio transmitter/receiver—were proven to work within the first hours after launch.

To prepare for Tuesday's planned activities, the spacecraft successfully executed a large turn Friday, Oct. 30, to point the ion engine toward the Sun. Sunlight heated portions of the xenon feed system and the ion thruster core (which reached about 110 C [230 F]), and baked off some contaminants that held the potential to interfere with the engine's opera-

tion. While the spacecraft remained in that orientation, a small amount of xenon from the ion propulsion system was allowed to flow through the system to assure there were no blockages. The spacecraft returned to its previous orientation the next day.

On Thursday, Nov. 5, a heater inside the thruster's cathode was turned on and the xenon system was pressurized. As a final test before thrusting, xenon was ionized inside the thruster on Monday, Nov. 9, but was not accelerated. Engineering data show that the test went as planned. The suite of diagnostic sensors onboard to measure the effects of the ion propulsion system on the local space environment worked as planned.

Once Tuesday's behavior is diagnosed and resolved, the engine is scheduled to be turned on intermittently for the remainder of the mission, which ends in late September 1999. □



Dr. Richard Doyle

## Doyle new Division 39 manager

Dr. Richard Doyle has been appointed manager of the Information Technologies and Software Systems Division 39.

Doyle, who replaces the retired Chris Carl, was previously the technical section manager of the Information and Computing Technologies Research Section and assistant program manager for JPL's Autonomy Technology Program. He served as the technical group supervisor of the Artificial Intelligence Group at JPL from 1989-95. In 1993-94, he spent six months as a Visiting Scientist in the mission operations directorate at the Johnson Space Center in Houston.

Doyle received his doctorate in computer science at the Massachusetts Institute of Technology's Artificial Intelligence Laboratory in 1988, his master's degree in electrical engineering and computer science from MIT in 1984, and a bachelor's degree in mathematics, *summa cum laude*, from Boston University in 1980.

He originally worked at JPL from July 1980 to December 1991 as an analyst and programmer in the spacecraft Navigation Systems Section. While earning advanced degrees, he returned to JPL during summers to work in the Artificial Intelligence Group. □

## El Niño studies on display

QuickScat Project Manager Jim Graf, left, and JPL Director Dr. Edward Stone check out one of three new interactive displays in the von Kármán visitor center that highlight the Laboratory's Earth science missions studying El Niño. The unit Graf and Stone are viewing shows an interactive map that describes El Niño's effects worldwide; another shows three videos describing how TOPEX/Poseidon and the NASA Scatterometer (NSCAT) function; the third display explains satellite scatterometry, where the visitor sees how the display's surface affects the scattered microwave energy. A similar set of displays is soon to be loaned to the California Science Center in Los Angeles.



PHOTO BY TOM WYNNE / JPL PHOTO LAB

## News Briefs

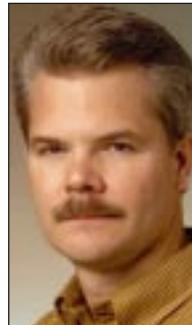
**Stephen Prusha** has been named the manager of the Cross-Enterprise Technology Development Program implementation office in the Technology and Applications Programs Directorate.

The program focuses on development of fundamental technologies of relevance to multiple NASA enterprises. This is a new function that JPL will perform agency-wide for NASA's Advanced Technology and Mission Studies Division, Office of Space Science. It resulted from a 2½-year effort to define a new planning and implementation architecture and process for the agency's crosscutting technology development activities.

A JPL employee since 1984, Prusha has developed and managed space flight technology experiments on a variety of flight platforms. From 1994-96, he managed the Technology Flight Experiments Office in TAP's Space Mission Technology Development Program. Most recently, he worked on technology development analysis and planning for TAP's NASA programs. □

Nominations for JPL's Award for Excellence, which recognizes significant contributions made by JPL individuals and teams, will be accepted starting Nov. 30.

This year's call for nominations will cover contributions made from Jan. 1 through Nov. 30, 1998.



Stephen Prusha

Submissions will be divided into two segments; nominations from JPL personnel in the technical organizations (3X, 4X, 5X, 7X, 8X, and 9X) will be accepted Nov. 30 through Dec. 18 and nominations from JPL personnel in business operations organizations (1X, 19X, 2X, and 6X) will be accepted Jan. 4 through Jan. 22, 1999.

The Award for Excellence, an employee-owned program, is a cash award. Nominations are submitted to the Reward & Recognition administrator in one of four categories: technical excellence, business operations excellence, exceptional leadership and exceptional quality.

The award ceremony will take place in May 1999. More information and nominations forms are available on the Reward & Recognition home page at <http://eis/sec614/reward/excel.htm>. For more information, call the Reward & Recognition Program Office at ext. 4-3825. □

The next JPL/Red Cross blood drive will be held in von Kármán Auditorium on Nov. 17 from 10 a.m. to 3:15 p.m. and Nov. 18 from 7 a.m. to 12:15 p.m.

Sign-up sheets will be available prior to the blood drive at the ERC, Occupational Health Services (Building 263) and Occupational Health Services' home page at <http://eis/medical>.

If you have not signed up ahead of time, or wish to change your appointment, call **Ginger Morris** at the Pasadena Red Cross at (626) 799-0841, ext. 630.

The Red Cross collected 143 pints of blood in the August blood drive on Lab, up from the May collection of 130 pints of blood. □

## MGS

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molten lava. This implies that the area in the planet's northern lowlands was once the site of giant ponds of lava flows hundreds of kilometers (hundreds of miles) across, according to Dr. Alfred McEwen of the University of Arizona, a member of the Global Surveyor science team.

"NASA Viking mission images of the same region showed a surface of dark plates with intervening bright surfaces that did not quite make sense," McEwen said. "Some scientists thought they could somehow be volcanic, while others thought they might be related to differences in the way that wind had eroded a dried lakebed. With these new images in hand, it is now quite easy to understand the older, lower-resolution Viking images."

McEwen and his co-authors believe that lava erupted near this area and the upper surface became crusted, then cooled and cracked. Some cracks widened and portions of the surface crust became rafts of solid rock that moved in the direction that the molten lava was flowing underneath. Other Viking and Global Surveyor images have shown similar plate-like lava textures in nearby Marte Vallis, implying that some of the lava from Elysium Basin spilled into this valley and flowed thousands of kilometers to the northeast.

"The sparse occurrence of impact craters on these plate-like lava surfaces suggests that the eruptions happened relatively recently in Mars' history," McEwen explained. "These eruptions could be much younger than the

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**Viking mission images of the same region showed a surface of dark plates with intervening bright surfaces that did not quite make sense . . . with these new images in hand, it is now quite easy to understand the older, lower-resolution Viking images.**

—Dr. Alfred McEwen  
Global Surveyor science team

youngest of the large Martian volcanoes like Ascreaus Mons and Olympus Mons in the Tharsis region, but they would still have occurred many, many millions of years ago. So these images should not be treated as evidence that Mars is volcanically active today."

Additional close-up views of Martian sand dunes in the north polar region are showing scientists detailed patterns of ongoing movement of sand across the planet for the first time. Drs. Kenneth Edgett, staff scientist at Malin Space Science Systems, San Diego, and Michael Malin, Mars Global Surveyor camera

principal investigator, report the presence of many fresh dunes that have been active as recently as July or August.

"The north polar cap of Mars is surrounded by a zone of dark dunes," Edgett said. "These were first seen by Mariner 9 as a rippled texture, and by the Viking orbiters as definitive sand dunes. Between late July and mid-September 1998, Mars Global Surveyor's closest passage over the planet took us right over the north polar dune fields four times a day. This provided us with many opportunities to take high-resolution pictures of these mounds."

Martian dunes typically contain granular fragments of rocks and minerals ranging from 0.002 to 0.08 inches (0.06 to 2 millimeters) in size, which puts them in the geologic classification of "sand." The sand appears to have been transported by wind in one of two ways: either by hopping over the ground, a geological process called "saltation," or by rolling along the ground, a process known as "traction."

Some of the dunes appear to be coated with thin, bright frost that was left over from the northern winter season that ended in mid-July, according to Edgett and Malin. This frost is covered with dark streaks emanating from small dark spots that dot the bases of many of the dunes. "The simplest explanation is that gusts of wind have blown the dark sand out across the frost-covered dunes, creating a streak of deposited sand over the frost," Malin said. "Some spots seen in the close-ups have multiple streaks, each one indicating that a different wind gust has moved in a different direction."

The images are available on the Internet at <http://photojournal.jpl.nasa.gov> and <http://mars.jpl.nasa.gov>. □

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thermal emission spectrometer, which was part of the originally proposed payload, and a Moessbauer spectrometer designed to study Martian materials.

Three human exploration experiments developed under NASA's Human Exploration and Development of Space (HEDS) Enterprise are also included in the lander payload: the Mars Environmental Compatibility Assessment Project experiment, an instrument to investigate potentially hazardous atmospheric conditions that could affect human exploration; a Mars propellant production experiment to explore the feasibility of using atmospheric carbon dioxide to manufacture fuel for return vehicles; and a Mars radiation experiment to detect hazardous amounts of the substance in the Martian atmosphere.

In addition, a simpler, lighter-weight rover modeled after Mars Pathfinder's Sojourner rover was chosen to replace the original, more sophisticated and costly roving vehicle. The new rover, nicknamed Marie Curie, will carry an alpha proton X-ray spectrometer similar to the spectrometer carried on the Sojourner rover to study the chemical composition of rocks and surface soils and a second Mars radiation experiment to detect harmful levels of radiation on the Martian surface.

NASA will begin the series of sample-return

mission in 2003, with launch of a lander and a rover that will spend several months searching for and collecting rock and soil samples, said Dr. Daniel McCleese, chief scientist and manager of the Office of Strategy and Science Programs for JPL's Mars Exploration Directorate. The roving vehicle will return the sample to a new, low-cost, low-mass Mars ascent vehicle.

Conceived by Brian Wilcox of the JPL Mars Exploration Technology Development Division, the Mars ascent vehicle is the centerpiece of the program's overarching, short-term goal to explore the Martian subsurface robotically. The vehicle is a simple rocket with a three-stage, spin-stabilized ascent system, solid-rocket motors, minimal onboard guidance and virtually no moving parts. The launcher, which weighs about 100 kilograms (220 pounds) or less than 30 percent of previous Mars ascent vehicle designs, will place soil and rock sample canisters into a low-Mars orbit, where they will await pick-up by orbiters arriving at Mars beginning in 2005.

NASA will also provide a Boeing Delta 3-class launch vehicle and an Earth entry capsule comprised of a crescent-shaped heat shield and crushable foam material that will shield the Martian soil and rock samples when they plummet to the floor of a desert in Utah in spring 2008.

In partnership with the French space agency, Centre National d'Etudes Spatiales (CNES), NASA will also work toward developing a small "microspacecraft" weighing less than 200

kilograms (440 pounds) for delivery to Mars during this launch opportunity, Elachi said. CNES has agreed in principle to providing a piggyback ride to Mars on its Ariane 5 launch vehicle, which is capable of placing the Martian microspacecraft on a geosynchronous transfer orbit above Earth. If flown, the miniature spacecraft would use its own propulsion and gravity assists from the Moon and Earth to gain enough momentum to reach Mars.

Another collaborative arrangement with the Italian space agency, Agenzia Spaziale Italiana, will add a drill and other robotic elements to the 2003 Martian lander and those following in its footsteps. Additional robotic elements will include radio relay equipment to support the European Space Agency's proposed "Mars Express" orbiter, which will be used for data transmission from landers arriving at Mars in future years. The European Space Agency also plans to supply a sounding radar for the mission.

In 2005, a single Ariane 5 launch vehicle carrying a duplicate of the 2003 lander, rover, Mars ascent vehicle and French orbiter will be launched to Mars. The lander, with its companion rover and ascent vehicle, will land at a different location, collect a second sample of Martian rocks and soils and loft it into low-Mars orbit.

The orbiter will be inserted into a highly elliptical Mars orbit, aerobrake to low-Mars

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# JPLers join 3-day walk for breast cancer research

Four JPL employees joined more than 2,000 people who walked three days from Santa Barbara to Malibu last month to raise funds for the fight against breast cancer.

Shari Asplund of Section 870, Cheryl Baker of Section 311, Nancy Feagans of Section 391 and Nancy Neilan of Section 621 did their part for Breast Cancer Awareness Month by walking almost 100 kilometers (60 miles) in the first-of-its-kind event Oct. 23-25, sponsored by Avon Products Inc.

Asplund said the walk's original fundraising goal was \$2.5 million, "but with the enthusiasm of the walkers and the generosity of the contributors, more than \$5 million in net proceeds was raised. These funds will bring education, screening and care directly to thousands of medically underserved women throughout the United States."

Organizers said the event will benefit at least 30 charities.

Each walker was required to raise a minimum of \$1,700. The JPL walkers had no trouble gathering the funds, noting that individual contri-



PHOTO COURTESY OF NANCY NEILAN

butions ranged from \$5 to \$500.

After departing Santa Barbara, the walkers were aided every few miles by "pit stops" for food, drink and bathroom breaks. In addition, almost 500 volunteer crew members organized the event and helped along the route with traffic and other logistics.

In all, the line of 2,382 walkers stretched as far as three miles.

Among the support crew were Asplund's husband, Nils, who helped

transport injured walkers, and JPL employee Dennis Byrnes of Section 312, a member of the traffic crew, whose wife Rosalee walked the route.

Participants bedded down at darkness in giant campsites that included hot showers, massage therapy and medical facilities.

All along the route, Asplund said, onlookers lined up to wave,



PHOTO COURTESY OF SHARI ASPLUND

applaud, congratulate and thank the walkers. "The encouragement meant a lot, especially as the miles and blisters added up," she said.

Each year, about one in nine women in the United States is diagnosed with breast cancer, and Asplund said research shows that 1 million American women have the disease without knowing it.

Besides walking for a worthy cause that will aid education programs for the leading cause of death in women between the ages of 40 and 55, the crusade became a personal statement for many, Neilan noted. Numerous breast cancer survivors and survivors' family members joined in, including two of the walkers from JPL who said breast cancer has affected their families.

Avon plans similar events in 1999 in Atlanta, Chicago, Los Angeles and New York. □

## Lab's ISO pre-assessment audit next week

By KERRY LYN CASSIDY  
ISO 9001 Implementation Team

Over the span of a week beginning Monday, Nov. 16, three auditors from the NASA-selected third-

party registrar Det Norske Veritas (DNV) will visit the Lab to conduct an audit to assess the Lab's readiness for ISO 9001 certification. This audit is aimed at giving the Lab a chance to improve systems and procedures in order to be ready for certification by March 29, 1999.

Employee notebooks have been distributed Lab-wide and should be kept handy to serve as a guide as work is done and to aid in answering questions during employee

interviews with the DNV auditors. Employees need to be able to locate the documents and procedures that govern their work. They should know the JPL Quality Policy that is posted for easy reference throughout the Lab and which states: "JPL will deliver products that meet or exceed customer expectations, while reducing cycle time and cost."

The DNV audit is conducted in part to determine the effectiveness

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orbit, rendezvous and dock with the 2003 orbiting sample container and then rendezvous and dock with the 2005 sample. After 11 months in orbit, the spacecraft will fire its rocket engines to inject itself and the two Earth entry capsules on an Earth-return trajectory. The orbiter will target the two entry capsules carrying Martian samples onto impact trajectories, deploy them and then deflect its own trajectory so that it does not crash into Earth.

Two options are currently on the table with NASA and the French space agency for inserting the 2005 orbiter into Mars orbit.

The first option would be to use propulsive maneuvers to lower and circularize the spacecraft's orbit. The second option would be to use a technique called "aerocapture," which is similar to aerobraking but would slow and directly capture the spacecraft in orbit in one step, rather than gradually slowing and lowering the spacecraft through a series of "walk-in" phases used in the aerobraking strategy. With aerocapture, the orbiter would be able to reach its final, circular mapping orbit within about one week instead of approximately nine months.

If international participation and the budgetary outlook remain stable, a total of six samples from six separate locations on the surface of Mars

will have been returned by 2013, Haynes said.

To realize this scenario, another Delta 3-class launch vehicle would be used in 2007, carrying a lander, rover and Mars ascent vehicle. The samples collected would be cached on orbit to await pick-up by the 2009 orbiter. In 2009, two launches using Delta 3-class launch vehicles would follow suit. The orbiter would be the first vehicle to be launched, followed by a second lander, rover and Mars ascent vehicle. A French orbiter would collect the Mars samples from both the 2007 and 2009 landers and deploy them on return trajectories to Earth. If successful, that mission scenario would be repeated in 2011 and 2013. □

## Passings

**Merilyn Walker**, 70, a retired administrator in Section 514, died of cancer Oct. 21 at her home in Glendale.

Walker joined JPL in 1979 and retired in 1991. She is survived by her sons, Kenyon and Wyatt Winsor.

Services were held at Grand View Memorial Cemetery in Burbank. □

# Change in *Universe* publishing schedule prompts new deadlines

*Universe* readers are advised to note changes in publication dates and deadlines for the next several issues of the newspaper.

Due to the Thanksgiving holidays, the next issue of *Universe* will be distributed Wednesday, Nov. 25. The ad deadline for that issue will remain unchanged at Monday, Nov. 16.

To facilitate coverage of the scheduled launch of JPL's Mars Climate Orbiter on Dec. 10, publication of the newspaper will be

delayed one week, to Dec. 18. The advertising deadline for the Dec. 18 issue will be extended to Wednesday, Dec. 2.

And because of a spate of JPL holidays coming at the end of December, a second *Universe* will not be published that month. Following the Dec. 18 issue, the next publication date will be Friday, Jan. 8.

The ad deadline for the Jan. 8 issue will be Monday, Dec. 21.

As always, ads are due at 2 p.m., either by e-mail to [universe@jpl.nasa.gov](mailto:universe@jpl.nasa.gov) or on ad cards, available at the ERC and *Universe* office, Building 186-118. □

## A few words about *Universe* advertising

- *Universe* is not responsible for the quality of merchandise sold or claims made through its ads.
- Ads are for the exclusive use of JPL and Caltech employees, contractors and retirees, and their immediate families.
- Please provide your full name, as well as your home phone number and work extension. If applicable, indicate Caltech employee, retiree, etc.
- Only home phone numbers and e-mail addresses are to be used for items for sale or rent and in the Wanted and Free sections; work extensions may be published for lost-and-found items or carpool/vanpool information only.
- Ads are accepted only on *Universe* ad cards or via e-mail. Cards are available from our office in Building 186-118 (adjacent to von Kármán Auditorium) or at the ERC. Or, if you prefer, we will mail ad cards to any JPL office or facility. Send e-mail ads to [universe@jpl.nasa.gov](mailto:universe@jpl.nasa.gov).
- No faxes, handwritten ads or photocopies of ad cards are accepted, with the exception of submissions for the "Letters" section. Also, ads are not taken over the telephone.
- There are still many old ad cards floating around with the wrong deadline

on them. Unless otherwise noted (as in the article above, for example), the actual deadline is the Monday following publication, at 2 p.m., for the next issue. For example, the ad deadline for the Nov. 25 *Universe* is Monday, Nov. 16.

- We ask that readers not submit ads for "work sought," such as employment for child care, housekeeping, etc.

- Also not acceptable are ads for private businesses, franchises, dealerships, distributorships, etc., and products sold through those means.

- Ads for weapons, ammunition, etc. are not accepted.

- Real estate ads (for rent and sale) must be signed on the back of ad cards (non-discrimination clause). E-mail ads will be returned to advertisers with this clause included for an "electronic" signature.

- Those placing housing and vehicle ads should be listed as an owner on the ownership documents.

- Prices listed on rental ads are shown per month unless otherwise specified.

- Telephone numbers on ads are in the 818 area code unless otherwise specified.

Thank you very much for your compliance and understanding. □

## Upcoming ad deadlines

Issue date	Deadline
Nov. 25	Nov. 16
Dec. 18	Dec. 2
Jan. 8	Dec. 21

## ISO

### Continued from page 6

of the Laboratory's product delivery system in meeting those quality objectives that can be found listed on the Quality Policy posters.

Basic audit etiquette suggests giving clear, factual answers to the auditor. Be professional, courteous and direct the auditor to your supervisor if you do not know the answer to any question. Be confident. No one knows your job better than you do. Don't offer additional information.

The ISO 9001 web site at <http://iso> is a valuable resource for preparing for the pre-registration audit. For example, take the quiz in the ISO training section, which contains typical questions an auditor might ask. Surf the site for answers to questions on ISO 9001, the JPL product delivery system, and other helpful information in preparation for the audit.

As part of the NASA strategic plan, Administrator Daniel Goldin has asked that all NASA centers be ISO-certified by September 1999. This pre-assessment audit is an important step along the road to certification. □

## FOR SALE

AFGHANS, hand-crocheted, men's and women's, many colors, great gifts, \$25/ea. 249-2596.

BARSTOOLS (2), like new, hardly used, moving-out sale, \$290/pair/obo. 626/446-6456.

BEDROOM SET, oak, large dresser, dressing table with mirror, headboard, end table, TV stand, vg cond., \$249/obo for all. 909/592-2279.

BIKE, Fuji 12-speed, medium size, good cond., aluminum wheels, Suntour shifters, \$90 firm. 626/794-0886, Ted.

COFFEE TABLE, 24" x 60", walnut-colored wood, center cabinet, good cond., \$50/obo. 626/307-0920.

COMPUTER, Intel 286 8/12MHz PC w/80MB HD, 2MB RAM, 15" color-enhanced VGA, 5 1/4" FD, computer stand, 1200 baud Hayes smart modem, keyboard, monitor, CPU cover; all in exc. cond., \$200/obo. 626/446-6456.

COMPUTER, Power Book 280C with 320HD, 12 MB RAM, 28.8 modem with docking station with 1 GB HD, a/c adapter, SCSI connection and leather case, etc., \$600/obo. 832-5556.

COMPUTER, Power Computing 120MHz 601 (like PowerMac 7100), 48MB RAM, 500MB HD, Mac OS 7.5.5, incl. bundled software, \$500/obo. 626/568-9890, Alan, after 6 p.m.

COMPUTER ACCESSORY, for Macintosh, Microsoft Sidewinder 3D Pro joystick, good condition, hardly used, \$50. 626/795-6530, evenings.

COMPUTER SYSTEM with software, 486 pc, 66 MHz, fax modem; 12-in. color monitor; HP Deskjet 520 printer; works well;

\$250. 790-4984.

COMPUTER TABLE SET; white Formica assembled table with slide-out keyboard shelf, hardy metal construction, 3 joined sections produce a modern-style table 84" W x 24" D x 29" H; matching printer table on 4 wheels, 22" W x 16" D x 18" H, has paper tray protruding below front; \$125 total. 213/654-0387.

COMPUTER UPGRADE CARD, AdvanSys UltraSCSI-3 PCI accelerator, offers maximum transfer speed of 20MB/sec., external and internal connectors, PowerMac and PC compatible, \$75. 626/795-6530, evenings.

DESK, 33" x 59", \$35/obo; OFFICE CHAIR, \$25/obo; TYPEWRITER, IBM electric, \$25/obo. 249-2596.

DESK, for office, 30" x 60", 2-drawer on left, 3-drawer on rt., w/cloth executive chair, good cond., \$125/obo. 626/307-0920.

DINING ROOM TABLE: exquisite 6' x 4', beveled leaded glass table, glass "V" shaped gold & brass pedestals, with 4 high-backed black chrome & brocade chairs, perfect condition, all for \$399/obo. 249-4561.

DRYER, gas, Kenmore, vg cond., \$125/obo. 626/798-1546.

EXERCISE EQUIPMENT, step, with video, \$10. 248-2807.

EXERCISE MACHINE, NordicTrack Achiever w/Fitwatch, exc. cond., \$350. 805/255-5645.

FREEZER, Sears upright, 18 cu. ft., \$75, Valencia. 805/287-4446.

FURNITURE: merging two households, all items in good condition; dining room table and chairs, roll top desk, computer desk, grandfather clock, bar and stools, microwave, 4 cu. ft. freezer, television console, upright vacuum cleaner, more. 791-1266.

GENERATOR, Redi-Line electric, 1600W, for boat, van, RV, etc.,

\$400/obo. 249-2596.

GLASSES, beautiful Lenox casual, 10 juice, 13 water, mint condition, \$2.50/ea.; JEANS, ladies', Lee, 2 prs. size 8L, 1 pr Cross Color with matching belt, excellent cond., \$10; PANTS, men's corduroy, 1 DKNY and 1 ixiz, 36 x 30, excellent cond., \$7/ea. 626/445-4690.

HOCKEY TICKETS, individual games for L.A. Kings; Colonnade on blue line; 2 aisle seats with Forum parking, \$60 for all (\$87 face value). 626/331-9998.

LOVE SEATS (2), off-white w/touch of lt. blue and 2 pillows to match, \$150/ea. or optional; DINING ROOM SET, traditional, wood, with 6 cream-color chairs, seats up to 8, \$300 firm. 626/296-3159.

MONITOR, color SGVA, 13" NEC, .28 dpi, pwr. cord, \$50/obo. 248-7331.

MOVIES, DVD, unopened in cases, \$18; sell or trade for used titles. 626/795-4928, x206.

ORGAN, Technics SX-EX50M, U & L manual each 44 keys, pedal 13 keys, 1-touch play, play sequencer, voice setting computer tone selector, techni-chord, tempo set, Autoplay chord, too many features to list, like new, \$1,850/obo. 626/446-6456.

PERSIAN RUGS, assorted, different sizes and kinds, \$100 to \$1,690 each. 626/446-6456.

PING PONG table, exc. cond., 1 1/2 yrs. old, \$85. 562/695-5197.

PRINTER, Epson LQ200 dot matrix, exc. cond., extra ribbon and cover, \$50/obo. 248-7331.

PRINTERS, Epson FX-80 dot matrix, like new, \$49/obo; Epson

Continued on page 8

LR-510 dot matrix like new, \$99/obo. 626/446-6456.  
 RECORDING STUDIO, Foster 8-track, low hours, 12-channel, 8-bus console, power amp & effects included, \$1,250. 626/791-2700.  
 SKIS, Autier w/Marker II titanium bindings, 194cm, exc. cond., \$75. SKI BOOTS, Lange 55, M sz. 12, exc. cond., \$75. 626/793-3561.  
 SPORTS COINS, '88 Topps, 36 unopened baseball packs, Ryan, Seaver, Bench, McGwire, Bonds; \$20/box; '87 unopened packs, McGwire rookie possible, grocery packs, \$10 for \$45 cards. 626/914-6083.  
 SPORTS EQUIPMENT: rower, like new, \$50/obo; ski simulator, like new, \$50/obo. 626/446-6456.  
 STEREO EQUIPMENT: Yamaha receiver, 100w/ch, built-in 5-band equalizer, remote, fantastic sound, exc. cond., \$139; Onkyo Dolby prologic surround sound decoder with center/rear channel amps, remote, attach to any receiver to upgrade to Dolby prologic for home theater, \$129; Yamaha pre-amp, Dolby surround sound decoder, many a/v inputs, univ. remote, exc. cond., \$99. 909/592-2279.  
 TOOLS, precision hand, gauges, new & used; micrometers, etc.; \$10/ea./obo. 249-2596.  
 VIDEO GAME, Super-Nintendo set: System, 2 controllers, 7 games, exc. cond., \$120/obo. 909/592-2279.  
 VIDEO GAMES, Nintendo 64; Turok Dinosaur, Pilot Wings, Star Fox, Gex Enter the Gecko, Super Mario, Star Wars; \$30/ea. 626/355-5457.  
 WEB TV Plus, w/wireless keyboard, 1 KB hard drive and smart card port, hardly used, exc. cond., great Christmas gift; \$250 + tax new, sell \$150. 805/724-2408.

## VEHICLES / ACCESSORIES

'91 ACURA Legend LS, white w/blue leather interior, mint cond., loaded, new tires, 74k mi., \$12,800. 626/358-8648.  
 '85 BUICK Regal Limited, vg cond., clean in & out, \$2,700/obo. 714/523-8479.  
 '92 CADILLAC Sedan Deville, burgundy w/tan leather interior, tinted windows, all power, am/fm/cass., new tires, trans., well maintained throughout ownership; runs & looks great, \$9,500/obo. 626/794-4352.  
 '95 CHEVROLET Corvette coupe, red, chrome rims, auto trans., am/fm/CD/ cass., tan leather, 38K mi., ext. warranty, immac., \$23,900. 790-6738.  
 '90 CHEVROLET Lumina APV 7-passenger mini-van, loaded, only 54,600 miles, new brakes/ tires/battery, auto trans., ps/w/dl, a/c, cruise control, cassette, tilt, anti-theft device, exc. condition, \$7,099. 909/594-3935.  
 '93 CHRYSLER Concorde, exc. cond., loaded, alarm sys., \$11,500. 949/766-0223.  
 '92 CHRYSLER LeBaron, 4 door, auto trans., tilt wheel, pwr. doors, pwr. windows, cruise control, deluxe interior, 63,300 mi. 957-7554, Bob.  
 '78 DATSUN 280Z, exc. cond., interior restored, new injectors & Seabring exhaust, 64,000 orig. mi., \$2,700/obo. 626/791-2700.  
 '72 DATSUN 240Z, rare model, auto trans., vintage top 1 owner, original paint, vg cond., interior restored, dual Webber carbs, Dynomak exhaust, rebuilt from ground up, a true classic; book \$9,500, sell \$4,500/obo. 626/791-2700.  
 '84 DODGE D-50 pickup truck, vg cond., auto, 2.6 eng., tilt wheel, bedliner, shell, new battery, very clean, well maintained, 138K mi., orig owner, \$2,600. 626/332-2682.  
 '97 FORD Mustang, V6, white, auto, pw/door locks/seat, a/c,

75,000 mi. mechanical breakdown insurance, exc. cond., 35,700 mi. 626/335-9426.  
 '84 FORD Bronco II, 4x4, ps, pb, a/c, new brakes & hd radiator, 5-spd. stick, am/fm/cass., gd. cond., \$3,500. 714/529-1718.  
 '65 FORD Thunderbird daily driver, runs well, new front end, recently tuned up, some work needed, very restorable, \$1,800. 626/446-8733.  
 '88 GMC 1-ton extended cab, loaded, pwr. doors, pwr. windows, tilt wheel, camper pkg., towing pkg., shell, carpet kit, trans. & eng. oil coolers, 2 new & 2 nearly new tires, only 62,500 miles, 7.4-liter engine, \$10,500. 957-7554, Bob.  
 '98 HONDA Civic DX hatchback, red, brand new, 2,500 mi.; air, alarm, dual airbags; 6-yr. ext. warranty, take over payments, \$15,000. 626/304-0877.  
 '92 HONDA Accord shop manual and bra, \$55/both. 626/798-1607.  
 '85 HONDA Shadow 700cc, V-Twin, shaft drive, automatic valve adjustment, 6 speed (w/overdrive), water cooled; excellent tires, low maintenance, reliable, good condition, red and black; includes street fairing and Tourmaster saddlebags; \$1,800. 626/794-0886, Ted.  
 '88 ISUZU Trooper II, 4WD, A/C, stereo/cass, one owner, recent refurb. on brakes, tires, engine, \$5,000. 249-6910.  
 '97 MAZDA Protégé, dark blue w/tan interior, 43,000 mi., dealer-maintained, good cond., \$10,500. 626/294-0426.  
 '96 MAZDA Protégé, 4-dr., burgundy, 5-spd., dual airbags, a/c, 25K mi., orig. owner, exc. cond., \$9,500. 626/564-8986.  
 '89 MERCEDES 300SE, 93K, taupe (bronze), excellent condition, stock plus 6-CD changer, \$15,995. 891-6836, Steve.  
 '93 MERCURY Cougar, air, ps, pb, leather/walnut interior, exc. cond., \$5,400. 249-5337.  
 MOPED, Murray (Sears), 50cc, runs well, \$125. 790-4984.  
 '80 NISSAN 4X pickup truck, new engine & tires, \$1,800. 213/255-7932.  
 SAILBOAT, 13' Alcort catamaran w/trailer, reduced, must sell, \$400. 626/294-0426.  
 SAILBOAT, 13' Zuma, as new, cartoppable, \$1,400. 626/294-0426.  
 '98 TAHOE trailer by Thor, 24', queen-sz. bed, sofabed, dinette-bed, microw., awning, air, stereo, all amenities, used 3x, \$11,500. 805/533-4255.  
 '95 TOYOTA Celica convertible, loaded, service records, low mileage, white w/black interior, custom sheepskin seat covers, CD, alarm, exc. cond. 805/252-9313.  
 '90 TOYOTA Corolla, exc. cond., 96K mi., all dealer service, auto, new tires/brakes, am/fm/cass., a/c. 714/535-2994, Paul.  
 '87 TOYOTA Supra turbo, 5 sp., targa top, loaded, great cond., \$4,000/obo. 626/794-6142.  
 '80 TOYOTA Corolla wagon, white, 4-dr, 5-spd manual, 167K orig. owner miles, a/c, am/fm, maint. manuals, good cond., \$1,200/obo. 626/359-3486.  
 '97 VW Passat GLX, V6, leather interior, white, 4-dr., loaded, sec. syst. + LoJack, 6-CD stereo, cruise control, air, ext. warr., 4 new tires w/replacement insurance, just serviced. 323/258-4464.  
 '88 VW Cabriolet, Karman ed., black w/white top, 4 hd lights, perfect cond., automatic, a/c, takeoff stereo, \$4,100. 626/792-5132.

## WANTED

APARTMENT OR HOUSE in Pasadena, 3 bd., close to Caltech if possible. 626/791-7044.  
 CARPOOLER, Brea/Fullerton/Yorba Linda area, 7:00-4:00 flexible, non-smoking. Ext. 4-6418 or 714/529-1718, eve., Art.  
 COMPUTER, Notebook PC, 66MHz or better, with at least 16 MB+ RAM and 800 MB+ HD; any brand O.K.; e-mail with price to vimalmd@hotmail.com.  
 ENCYCLOPEDIA, solar powered, suitable for kids aged 6-12. 626/797-6982.  
 GOLF CLUBS, used, cheap. 626/256-1138.  
 HOST FAMILIES for Caltech International Students for Thanksgiving Day; 626/395-6330, Victoria Saha or e-mail victoria@cco.caltech.edu.  
 ROOMMATE to share furnished 3-bd., 3-ba. Pasadena apt. with Caltech post-doc, move in immed., \$400 + 1/3 util. 626/351-9641.  
 ROOMMATE, deluxe apt., fully furn., 1 block/ Caltech, master bd., ba., spacious, sunny, new a/c, carpeted, laundry, patio, stove, oven, microwave, refrig., dishwasher, utensils, sofa, phone, TV, computer, Xerox, fax, \$495. 626/449-8266, Vicky.  
 ROWING MACHINE. 626/797-6982.  
 SPACE INFORMATION & memorabilia from U.S. & other countries, past & present. 790-8523, Marc Rayman.  
 TENNIS PARTNER. 626/796-6759, Achim.  
 VOLLEYBALL PLAYERS, coed, all levels of play, Tuesday nights 8-10 at Eagle Rock High School, \$4/night. 956-1744, Barbara.

## FREE

BARBELL with weights. 249-2596.  
 CATS, sm. female silver tabby, fixed, 1 year old; male, beautiful w/tuxedo markings, not fixed, 1 year old. 951-6779.  
 LATHE, metal, 36" gap bed. 626/798-2430.  
 PUPPIES, 3/4 cocker spaniel, 1/4 dachshund, the best of both breeds, adorable, 8 weeks old, 2 tans and 2 blacks, all boys, need dog-loving home. 626/812-9107, evenings.

## FOR RENT

DUPLEX, upper 2 bd., 1 ba., 2 patios, sm. dog OK, all lights of planets and stars; stove, refrig. new cptg, paint; \$100 deposit. 352-5608.  
 LA CRESCENTA condo, 2 bd., 2 ba., washer/dryer, 10 min./JPL, great school, \$980. 890-5655 or 626/286-2880.

HOLLYWOOD KNOLLS area, 1-bd. apt. in 7-unit bldg. (adj. to Universal, Griffith Pk., Lake Hollywd & Toluca Lake/Burbank); pleasant hillside community w/close fwy. access; outside 1st floor entr., newly remodeled, hardwood oak flrs., new refrig., dishwasher, a/c-heat pump, solar-heated water incl., laundry rm. downstairs, covered parking; non-smr., \$650. 626/798-3235.  
 N. SAN GABRIEL townhouse, 20 min./JPL, 3 bd. + den, 2 1/2 ba., LR w/tp, cent. a/c, 2-car garage w/auto. opener, water/trash/gard. incl., no pets, \$1,200. 626/821-2007.  
 N. SAN GABRIEL, with Temple City schools; elegant, 3 bd. + den/4th bd., 2.5 ba., fireplace, master suite, small charming garden, like new, no pets, 9050-E Arcadia Ave., \$1,495. 626/939-3853.  
 PASADENA apt., 2 bd., 2 ba., cent. air, small patio, laundry facil., \$775 + util. 626/351-9641.  
 PASADENA guest house, spacious 1 bd., exc. neighborhood, washer, dryer, refrig., stove & utilities, \$750. 626/793-7937.  
 PASADENA townhouse-style apt., near PCC, 2 bd., 1 1/2 ba., refrigerator, built-in range & oven, cent. a/c, carpets, drapes, disposal, laundry, covered parking, \$725. 790-7062.  
 PASADENA house, 3-bd., 2 ba, patio, big yard, detached 2-car garage, 10 min. to JPL, walking distance to library, park, grocery and entertainment, quiet and friendly dead-end street, next to Hastings, \$1,100. 790-9275.

## REAL ESTATE

2-bd., 2-ba. house, very nice, lg. liv. rm., sep. dining rm., ceiling fans, fireplc., lg. tree, shaded, backyd., needs some TLC, pleasant diverse neighborhood, 20 min./JPL, no fwy. travel. 626/798-1546.  
 BIG BEAR, new cabin 2 blocks from lake, 2 bd., 2 ba., mud/laundry room, \$129,000. 909/585-9026.  
 PASADENA home, walk to JPL (2 mi.), 2 + 1, fireplc., dining area, updated kitch., all appliances + washer/dryer, exterior freshly painted, lg. patio, gazebo, sprinklers front/back. 626/821-1249, Sandy Radey.  
 PASADENA, good neighborhood; corner lot; beautifully restored 1933 Spanish; 2 bd., 2 ba., dining rm., living rm., den, screened back porch, detached 2-car garage; courtyard; walled gardens front and back; fireplace; hwd. floors; French doors & windows; bolted; 1,760 sq. ft. (house); \$299,000. 323/258-8518.

## VACATION RENTALS

BIG BEAR, 7 mi. from slopes; full kitchen, f/p, 2 bd., 1 ba., sleeps 6; reasonable rates; 2-night minimum; no smokers, no pets; exc. hiking, biking, fishing nearby. 909/585-9026, Pat & Mary Ann Carroll.  
 BIG BEAR cabin, walk to village, quiet area, 2 bd., slps 8, compl. furn., F/P, TV/VCR, \$75/nt. 249-8515.  
 BIG BEAR CITY, near airport, 2-bd., 1-ba. cabin, nicely furnished, sleeps 8; fireplace, TV, full kitchen, microwave; \$100 refundable cleaning deposit; \$75/nite weekdays, \$250 weekend (2 nites). 909/982-2986.  
 BIG BEAR LAKE cabin, near lake, shops, village, forest trails, 2 bd., sleeps up to 6, fireplace, TV, VCR, phone, microwave, BBQ and more, JPL disc price from \$65/night. 909/599-5225.  
 BIG BEAR LAKEFRONT lux. townhome, indoor/outdoor spa, near skiing, beautiful stone fireplace, sleeps 6. 949/786-6548.  
 CAMBRIA, ocean front house, exc. view, sleeps up to 4, \$125/night for 2, \$175/night for 4. 428-8853.  
 CORNWALL, ENGLAND, August 1999 total solar eclipse; prime location campsite on the path of totality; includes lecture series by Caltech, JPL and UK astronomers; http://www.ctg-windows.co.uk/eclipse.html. 626/356-2998.  
 HAWAII, Kona, on 166 feet of ocean front on Keauhou Bay, private house and guest house comfortably sleep 6; 3 bd., 2 ba., swimming, snorkeling, fishing, spectacular views, near restaurants, golf courses and other attractions. 626/584-9632.  
 HAWAII, Maui condo, NW coast, on beach w/ocean view, 25 ft. fr. surf, 1 bd. w/loft, compl. furn., phone, color TV, VCR, microwave, dishwasher, pool, priv. lanai, slps. 4, 4/15-12/14 rate: \$95/nite/2, 12/15-4/14 rate: \$110/nite/2, \$10/nite/add'l person. 949/348-8047.  
 LA JOLLA, ocean vw., steps to gorgeous beach, 1 bd., slps. 4, fully eqpd. kitch., linens, hot tub; Thanksgiv. wk., Nov. 23-27. 626/844-4670, Sandie or Mike.  
 MAMMOTH condo, 2 bd. + loft, 3 ba., slps. 8, spa, full kitchen, TV/VCR, covered parking; walk to Canyon Lodge; JPL discount. 249-8088.  
 MAMMOTH condo, studio + loft, 2 ba., fireplace w/wood supplied, Jacuzzi, sauna, game rm., color cbl. TV/VCR, full kitchen w/microwave, terrace, view, amen. 714/870-1872.  
 MAMMOTH condo in Chamonix at lifts 7, 8, 16, 17; walk to warming hut, 2 bd., 2 full ba., sleeps 6, fully eqpd. elec. kitch., microw. & extras, fireplace/wood, color TV, VCR, FM stereo, o/d Jacz., sauna; game, rec. & laundry rms., conv. to shops, lifts; spec. midweek rates. 249-8524.  
 MAMMOTH, Snowcreek, 2 bd., 2 ba., + loft; sleeps 6-8; fully equipped kitch. incl. microwave, D/W; cable TV, VCR, phone; balcony w/mtn. view; Jacz., sauna; streams, fishponds, close to Mammoth Creek; JPL discount. 626/798-9222 or 626/794-0455.  
 OCEANSIDE, on the sand, charming 1-22 condo, panoramic view, walk to pier or harbor, pool, spa, game rm., sleeps 4. 949/786-6548.  
 PALM SPRINGS condo, 1 bd., compl. furn., pool, spa, tennis, cable TV, VCR; carpets, paint, cooking utensils new; rent daily, weekly, weekends, monthly. 626/445-0884.  
 ROSARITO BEACH condo, 2 bd., 2 ba., ocean view, pool, tennis, short walk to beach on priv. rd., 18-hole golf course 6 mi. away, priv. secure parking. 626/794-3906.

# Universe

## Editor

Mark Whalen

## Photos

JPL Photo Lab

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Ads must be submitted on ad cards, available at the ERC and the Universe office, Bldg. 186-118, or via e-mail to [universe@jpl.nasa.gov](mailto:universe@jpl.nasa.gov). E-mail ads are limited to six lines.

Ads are due at 2 p.m. on the Monday after publication for the following issue.

To change an address, contact your section's administrative assistant, who can make the change through the HRS database. For JPL retirees and others, call Xerox Business Services at (626) 844-4102.